NAME

dineroIV − fourth generation cache simulator

SYNOPSIS

dineroIV [options]

DESCRIPTION

The *dineroIV* command is a trace-driven cache simulator based on the *dineroIV* library, documented separately.

The basic operation is to read memory reference trace records from the standard input, process them through one or more simulated caches forming a memory hierarchy, and write statistics on the standard output.

OPTIONS

Some options control overall operation, while others specify the basic parameters and arrangement of the caches to be simulated. In the following list of options, *F* is a string, *U* is an unsigned decimal integer, *C* is a single character, *A* is a hexadecimal address, and *S* is like *U*, but with an optional scaling suffix character (one of **kKmMgG**, for multiplication by 0x400, 0x100000, or 0x40000000). *P* is like *S*, but must be a power of 2, *N* is a cache level ($1 \le N$), where level 1 is closest to the processor, and *T* is a cache type (**u**=unified, **i**=instruction, **d**=data).

Some global options take 0 or 1 argument, while options that specify characteristics of a particular cache typically involve 2 or 3 arguments, with the cache level and type being incorporated into the option name as indicated.

−help
Print a synopsis of all the options and defaults. No simulation is done.

−copyright
Describe copyright terms for *dineroIV*.

−contact
Tell how to get the latest version of Dinero IV and how to contact the authors. This information is also available below, in **AUTHORS** and **COPYRIGHT**.

−dineroIII
Show what *dineroIV* command line arguments corespond to each *dineroIII* argument.

−custom *F*
Generate and run a customized version of the simulator, with the resulting executable named *F*. Most cache parameters are fixed and made into constants, with a resulting performance boost that is somewhat variable, but generally recommended for lengthy simulations. The fixed options are unsettable in the customized program; run *F* with the **−help** option to see exactly which options are still available. *F* is not removed following simulation, so it can be used for more than one run. The *dineroIV* source code must be available and properly configured for **−custom** to work, with the **D4_SRC** environment variable naming the directory.

−skipcount *U*
Disregard the initial *U* memory references from the standard input.

−flushcount *U*
Flush the cache after processing every *U* references read from the standard input.

−maxcount *U*
Stop the simulation after processing *U* references read from the standard input.

−stat−interval *U*
Show statistics after processing every *U* references read from the standard input. This is in addition to the statistics produced at the end of the full simulation.

−informat *C*
Select the input trace format as indicated by *C* (**D**=extended din, **d**=traditional din, **p**=pixie32, **P**=pixie64, **b**=binary). The exact current list of choices is given by the **−help** option. The default input format is **D**. See **TRACE RECORDS**, below, for more information.

−on−trigger *A*
Disregard trace records until one with address *A* is seen.

−off−trigger *A*
Disregard trace records after seeing one with address *A*.

−stat−idcombine
Combine the statistics for separate instruction and data caches.

−l*N***−***T***bsize** *P*
Set the block size of the specified level *N* cache to *P* bytes.

−l*N***−***T***sbsize** *P* Set the sub-block size of the specified level *N* cache to *P* bytes. If not specified, sub-blocks are not used (i.e., sub-block size = block size).

−l*N***−***T***size** *P* Set the cache size of the specified level *N* cache to *P* bytes.

−l*N***−***T***assoc** *U* Set the associativity of the specified level *N* cache to *U*.

−l*N***−***T***repl** *C* Set the replacement policy of the specified level *N* cache to *C* (**l**=LRU, **f**=FIFO, **r**=random). The exact current list of choices is given by the **−help** option.

−l*N***−***T***fetch** *C* Set the fetch policy of the specified level *N* cache to *C* (**d**=demand, **a**=always, **m**=miss, **t**=tagged, **l**=load forward, **s**=sub-block). The exact current list of choices is given by the **−help** option. Further information on fetch policies is given in *dineroIV*(3).

−l*N***−***T***pfdist** *U* Set the prefetch distance of the specified level *N* cache to *U* sub-blocks. The default is 1. This option is not valid for the **d** fetch policy, where no prefetching will happen.

−l*N***−***T***pfabort** *U* Set the prefetch abort percentage of the specified level *N* cache to *U* (0−100). The default is 0. The specified percentage of prefetch requests will be randomly chosen to be aborted, i.e., not happen. This option is not valid for the **d** fetch policy, where no prefetching will happen.

−l*N***−***T***walloc** *C* Set the write allocate policy of the specified level *N* cache to *C* (**a**=always, **n**=never, **f**=nofetch). The exact current list of choices is given by the **−help** option. Further information on write allocate policies is given in *dineroIV*(3).

−l*N***−***T***wback** *C* Set the write back policy of the specified level *N* cache to *C* (**a**=always, **n**=never, **f**=nofetch). The exact current list of choices is given by the **−help** option. Further information on write back policies is given in *dineroIV*(3).

−l*N***−***T***ccc** Compute Compulsory/Capacity/Conflict miss rates for the specified level *N* cache.

TRACE RECORDS

A *dineroIV* trace record, as processed internally, consists of three things: an access type, an address, and a size. The following access types are supported:

- Read.
- Write.
- Instruction fetch.
- Miscellaneous. These references are treated like reads, but they never generate prefetches.
- Copy-back dirty (sub-)block(s), with no invalidation implied. This affects the whole cache if the indicated size is 0.
- Invalidate block(s), with no copy-back implied. This affects the whole cache if the indicated size is 0.

There are no internal restrictions on what constitutes a valid address, except that the size of an address is platform-dependent (generally 32 bits or more). The size value of a trace record indicates the number of bytes affected. Dinero IV imposes no size or alignment restrictions on memory references; they may span multiple sub-blocks or blocks.

The following input formats are supported by the **−informat** option:

d The traditional ‘‘din’’ format of Dinero III. Two fields are examined per line: access type and address. The access type is numeric: 0 for read, 1 for write, 2 for instruction fetch, 3 for miscellaneous, 4 for copy-back, and 5 for invalidate. The address is hexadecimal, beginning with an optional ‘‘0x’’ or ‘‘0X’’. Fields are separated by white space (space or tab), and everything following the first two fields of a line is ignored. To approximate the behavior of Dinero III, addresses are silently rounded down to a multiple of 4 bytes, and the data size for reads and writes is always assumed to be 4 bytes.

D An extended version of the traditional Dinero III input format, where each line contains three significant fields. The first field, specifying the access type, is a single letter (**rwimcv**) to indicate one of the access types described above. The second field is the hexadecimal address, and the third field is the hexadecimal size. A leading ‘‘0x’’ or ‘‘0X’’ is ignored at the beginning of each hexadecimal field. Fields are separated by white space (space or tab), and everything following the first three fields of a line is ignored.

p The format produced by **pixie −idtrace** on SGI IRIX systems.

P The format produced by **pixie −idtrace_ext** on SGI IRIX systems.

b A binary format, consisting of a four byte little-endian address, a 2-byte little-endian size, a 1-byte access type, and a byte of padding.

FILES

For the **−custom** option, the location of the Dinero IV source files is given by the **D4_SRC** environment variable.

SEE ALSO

dineroIV (3).

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The latest version of Dinero IV can be obtained from
ftp://ftp.nj.nec.com/pub/edler/d4-*X*.tgz
where *X* is the latest version number.

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